



# Pathways to human well-being in the context of land acquisitions in Lao PDR

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## ABSTRACT

Land acquisitions are transforming land-use systems globally, and their characteristics and impacts on human well-being have been extensively analysed through local case studies and regional or global inventories. However, national-level analysis that is crucial for national policy on sustainable agricultural investments and land use is still lacking. This paper conducts an archetype analysis of a unique dataset on land concessions in Lao PDR to provide a national-scale assessment of the impacts of land acquisitions on human well-being in 294 affected villages. The results show that land acquisitions influence human well-being through 18 distinct pathways. These pathways describe how some land acquisitions enhance or maintain well-being, while others elicit adverse impacts or trade-offs between well-being dimensions, particularly food security, income, and livelihood resilience. They further reveal five archetypal processes that mediate the effects of land acquisitions on well-being through: (i) shifting access to land and natural resources; (ii) commercialization of agriculture; (iii) availability of development opportunities; (iv) environmental impacts; and (v) employment opportunities within and outside land acquisitions. These processes affect well-being by shaping livelihood portfolios and dependence on natural resources. The majority of land acquisitions trigger trade-offs or adverse impacts on well-being. The small number of villages where well-being increased despite the presence of land acquisitions were mainly shaped by narrow and rigid preconditions. The archetypal processes and the explanatory factors suggest that it is imperative to protect smallholders' land-use rights and to avoid large-scale deals, as their adverse impacts outweigh opportunities and are more severe than the impacts of small-scale acquisitions. Employment opportunities may provide additional cash income but should not be exclusively relied upon.

## 1. Introduction

Land acquisitions have become a global concern as they transform land-use systems with major impacts on human well-being (Borras Jr & Franco, 2012; Cotula et al., 2009; Nolte et al., 2016). Widespread experience of adverse impacts and processes of land acquisitions have led to a global critique of land grabbing (Borras Jr & Franco, 2012). In response, land acquisitions have been temporarily suspended over the last decade in countries such as Cambodia and Lao PDR (Hett et al., 2020; Neef et al., 2013), while state and non-state actors at local, national, and global levels search for ways to regulate them (Debonne et al., 2019). A key issue emerging from this debate is the question of how land acquisitions affect human well-being (D'Odorico et al., 2017;

Oberlack et al., 2016). Using a recent, unique dataset spanning 176 land acquisitions affecting 294 sampled villages in Lao PDR, this article identifies pathways that explain the differential impacts of land acquisitions on human well-being.

Land acquisition or land deal refers to the transfer of land-use rights to domestic or foreign investors through purchase, lease, or concession by the government of a host country in the Global South (Anseeuw et al., 2012) for a variety of purposes including agricultural production, mining, infrastructure development, and conservation (Borras et al., 2012). Our analysis focuses specifically on land acquisitions for agricultural purposes. Benefits expected from land acquisitions include enhanced national agricultural production and food security through increased yield and productivity, job creation, and improved infrastructure and

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access to markets in rural areas (Deininger & Byerlee, 2011; Fitawek et al., 2020; von Braun & Meinzen-Dick, 2009). However, evidence from various countries has shown not only that these benefits have not materialized, but also that land acquisitions have undermined farmers' capacity to produce own food (Baird, 2010; Bottazzi et al., 2018) or reinforced social inequalities (Fitawek et al., 2020). Thereby, they have become a new challenge for sustainable development and a threat to human well-being in the Global South (Santangelo, 2018; Dell'Angelo et al., 2017a).

Land acquisitions and their impacts on human well-being have thus far primarily been analysed through case studies at local scales (e.g. Baird, 2011; Kenney-Lazar, 2012; McAllister, 2015), and regional and global inventories of land acquisitions (e.g. Davis et al., 2014; Rulli and D'Odorico, 2014) constructed through crowdsourcing (Messerli et al., 2015; Oya, 2013). However, analysis at the national level which is also considered important evidence and knowledge to inform the national policy for sustainable agricultural investments and land use, is still lacking. While case studies are suited to tracing detailed causal mechanisms in a highly contextualized and field-validated manner (Beach & Pedersen, 2016), they cannot provide evidence of generalizable patterns (Magliocca et al., 2018). Further, case selection bias may affect entire research fields, as cases with highly visible negative impacts, conflicts, or resistance may be more likely selected for study. Regional and global inventories provide important knowledge relating to spatial patterns but have not yet captured the implementation processes and well-being impacts due to the limited consistency and reliability of reporting (Messerli et al., 2015; Scoones et al., 2013; Zoomers et al., 2016). This study capitalises on a unique, recent dataset of land concessions and leases from Lao PDR containing information on main characteristics, agro-ecological contexts, implementation processes, and impacts of land acquisitions (Hett et al., 2018, 2020) to contribute to thorough understanding of the impacts of land acquisitions on human well-being.

The impacts of land acquisitions on well-being depend on a range of factors. Prior research has identified important factors to include the type, size, state of the acquisition (Andersson et al., 2016; Chiarelli et al., 2018; Deininger & Byerlee, 2011; Nolte & Ostermeier, 2017), prior land use (Edelman, 2013), implementation of the acquisition (De Schutter, 2011; Titcher, 2017), engagement of local communities in decision making (McCarthy, 2010), and socio-ecological contexts (Kaag & Zoomers, 2014; Scoones et al., 2013). But understanding remains limited about how these factors combine in different ways, how they impact human well-being, what processes explain different well-being outcomes, and how differences in social-ecological contexts affect differences in outcomes. This is due in part to the scarcity of reliable, large sample data that capture a wide range of scale and scope of land acquisitions.

This paper bridges this knowledge gap by addressing the overall research question: How do land acquisition types, implementation processes, well-being resources, environmental impacts, and socio-ecological contexts shape human well-being outcomes in Lao PDR?

Lao PDR presents a unique opportunity to assess this research question as recent research initiatives have generated a current and comprehensive quantitative and qualitative dataset of land acquisitions. The data set provides information on a wide range of acquisitions in terms of scale and scope across socio-ecological contexts, and details their characteristics, implementation processes, and impacts. Using this dataset, this study analyses the pathways that lead to different well-being outcomes in villages affected by land acquisitions. Insights into these pathways offer critical evidence to inform national and international efforts to regulate land acquisitions.

The remainder of this paper is structured as follows. The second section offers policy context on the debates on land acquisitions in Lao PDR. This is followed by a description of the analytical framework, approach, materials, and methods in sections three and four. Sections five and six present the main findings and discussion of the results. The final section presents our conclusions and policy recommendations.

## 2. Land acquisitions in Lao PDR

Lao PDR is at a crossroads of whether to renew policy supporting investments in the natural resource sector or to continue the moratoria on such investments first introduced in 2007 and sustained in 2009, 2012, and 2018 (Hett et al., 2020). Investments in the natural resource sector have been a key driver of the strong economic growth experienced by the country (IMF, 2019; World Bank, 2019). Between the early 1990s and 2017, inventory data shows that approximately 1.02 million hectares were granted for 1521 land acquisitions for agricultural, mining, and hydropower development (Hett et al., 2020), bolstered by strong government support in the mid-2000s (the Government of Lao PDR (GoL, 2004)). These investments enabled natural resource extraction, resulting in alarming rates of resource degradation and environmental contamination (Koch, 2017; Open Development Initiative (ODI), 2018). Concerned by the adverse implications of these land deals, the GoL issued several moratoria beginning in 2007 (e.g. GoL, 2012, 2007). From the GoL's perspective, suspension of new investments in tree plantations and certain large-scale mineral activities was intended to eliminate so-called "bad investments" that generate little benefit for the country but create significant adverse impacts on the local environment and livelihoods. To this end, the GoL instructed relevant ministries to assess the quality of all existing investments to inform appropriate regulations for existing and new investments. However, it may be a challenge for the GoL to differentiate good from bad investments, as many investments in Lao PDR have yet to generate profits or benefits (Baird, 2020). With limited revenue streams, the GoL continues to face trade-offs between attracting private sector investment to support economic development and protecting the country's natural endowments and local livelihoods (Vientiane Times (VT), 2017a, 2017b, 2019). As of 2018, the GoL has extended the suspension of new investments in these sectors (GoL, 2018a, 2018b), partly because the national revenue that the GoL expects from land deals e.g. through land concession and lease fees are likely to be less significant, and due to concerns for human well-being.

## 3. Concepts and analytical framework

### 3.1. Human well-being

Definitions of human well-being range from capabilities and functionings of a person's being and doing to freedom (Alkire, 2007; Sen, 1993). In this paper, we define well-being as, "the interplay between the resources that a person is able to command; what they are able to achieve with those resources, and in particular what needs and goals they are able to meet; and the meaning that they give to the goals they achieve and the processes in which they engage" (McGregor, 2007, p. 317). Well-being is comprised of objective dimensions, referring to socio-economic materials including food security, income, health, safe water, shelter, etc., and subjective dimensions, assessed as how a person values her or his being and doing, such as through self-respect, social integration, and freedom (Gasper, 2007; Sen, 1993). Based on this, well-being can be considered in three main components: i) well-being resources refer to the assets based on which households create their livelihoods (Chambers & Conway, 1992); ii) well-being outcomes refer to the outcomes for meeting basic needs and quality of life (Dawson & Martin, 2015); and iii) the value and meanings that a person ascribes to well-being outcomes (Dawson & Martin, 2015). Our paper focuses on changes in objective well-being resources and outcomes, which are also important preconditions for subjective well-being in the Lao context (Gasper, 2007; Korsgaard, 1993). At this time, data regarding values and meanings are limited.

In the Lao context, where rural livelihoods are largely based on smallholder agriculture (Lao Statistics Bureau (LSB), 2016; Nanthavong, 2017), we assess well-being outcomes by focusing on food security, income, and livestock production. Food security and income are not

only the centre of the global debate on implications of land acquisitions in the Global South (Baumgartner et al., 2015; White et al., 2012; Zaehring et al., 2018), but they are also fundamental elements of human well-being. Korsgaard (1993) suggests that access to adequate nutrition is the most fundamental precondition for achieving other functionings for human beings. Evidence across various countries has shown that levels of and increases in income enhance material well-being, such as improved food security through access to market food supply (Gartaula et al., 2016). These elements are also associated with subjective well-being achievements (McGillivray, 2007). We include livestock production as one of the main well-being outcomes, as it is a key element of livelihood resilience (Millar & Photakoun, 2008; Nanthavong, 2017). Sale of livestock is among the most common mechanisms for coping with stresses in rural Lao PDR (LSB, 2018).

We assess three aspects of well-being resources including human, natural, and physical, which have been the centre of the global debate on the implications of land acquisitions (Deininger & Byerlee, 2011; Hall et al., 2015; von Braun & Meinzen-Dick, 2009). Among natural

resources, we examine access to farmland, non-timber forest products (NTFPs), wild animals, timber and firewood, and water for agriculture. Analysis of human aspects focuses on potential skills and technology transfers by land acquisitions, while analysis of physical aspects focuses on improvement of road access by land acquisitions. Well-being resources related to financial and cultural assets are not considered due to data limitations.

### 3.2. Analytical framework of effects of land acquisitions on human well-being

This study analyses pathways to human well-being. We define a pathway to well-being as a process shaped by a configuration of explanatory factors that leads to well-being outcomes (see Fig. 1). The explanatory factors include (1) characteristics of land acquisitions; (2) land acquisition implementation processes; (3) change in access to well-being resources caused by land acquisitions; (4) environmental impacts of land acquisitions; and/or (5) socio-ecological contexts of affected

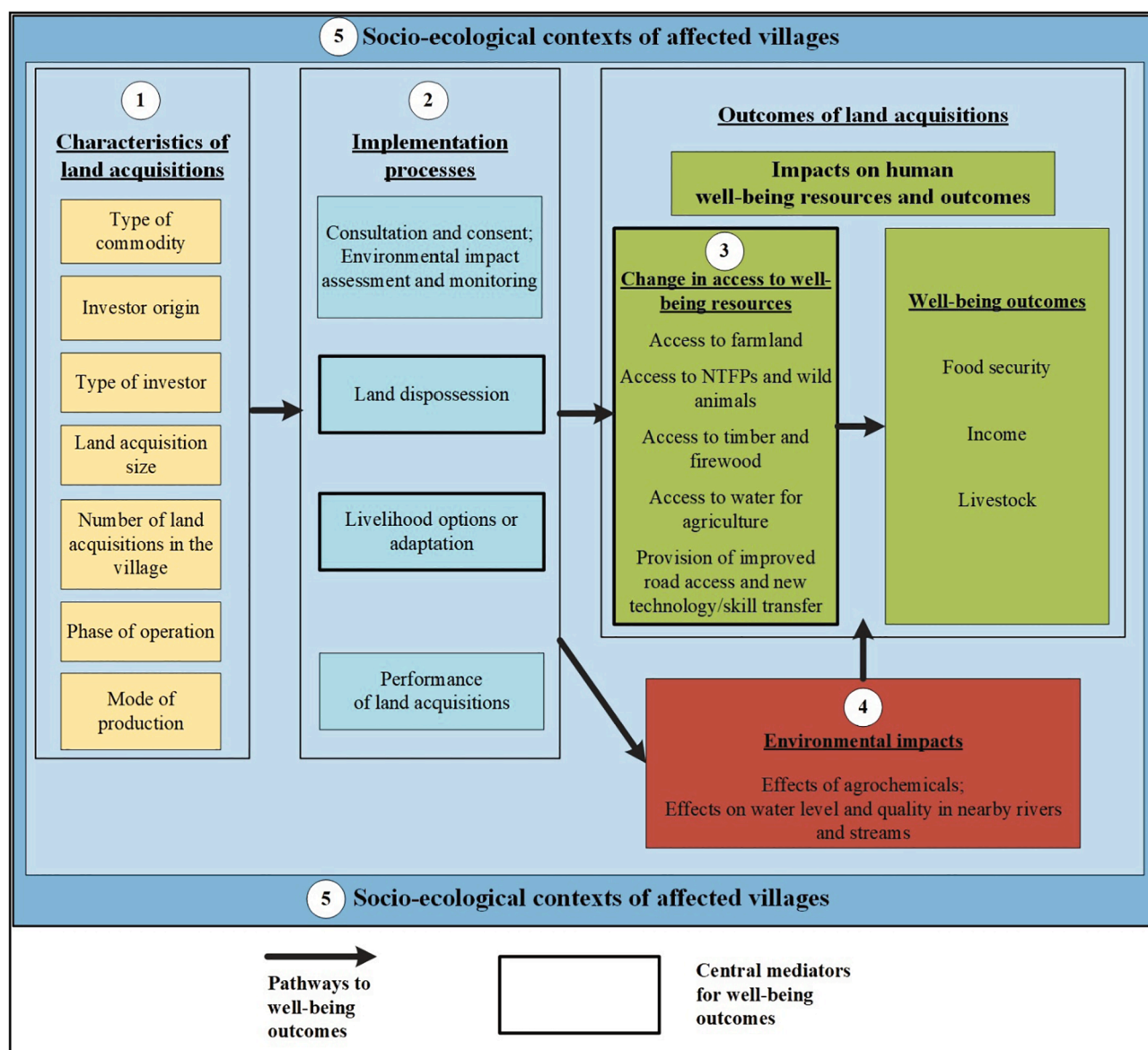


Fig. 1. Analytical framework showing impacts of land acquisitions on human well-being through five explanatory factors.

villages. For example, adverse well-being may occur from the decrease of access to well-being resources. This occurred when a significant amount of farmland and natural resources was expropriated and granted to large-scale or multiple land deals in one village, but villagers were unable to access new land due to the high population density in the village. Alternatively, certain types of land deals may result in significant environmental effects due to requirements of higher agrochemical inputs without adequate environmental impact assessment or monitoring.

We consider explanatory factors one to four mentioned above as direct influential factors of well-being outcomes. However, the fifth factor, socio-ecological contexts of affected villages, shapes the other four explanatory factors and influences well-being outcomes in more profound ways. Hence, we consider it as an indirect influential factor in our analytical framework. For instance, more remote areas may be less attractive to small and/or domestic investors due to higher transportation costs (Hett et al., 2020; Nanthavong et al., 2020), or in a village where the land title exists, villagers may be able to prevent land dispossession (FAO, 2012a, 2012b). Socio-ecological contexts also affect access to well-being resources. Villagers in more remote areas with low population density and available forest area may be able to claim new land to compensate for the losses (Nanthavong et al., 2020).

Further, land acquisitions tend to create negative impacts on the local environment including the loss of forest, flora and fauna, water and air quality (Davis et al., 2015; Hett et al., 2020; Zaehring et al., 2018). For instance, land acquisitions may compete for water from local users thus resulting in more prevalent negative water effects in the surrounding areas (Busscher et al., 2019; D'Odorico et al., 2017). Here, we consider changes in access to well-being resources and environmental impacts both as important impacts of land acquisitions in their own right and as influencing factors for well-being outcomes.

Fig. 1 visualizes the analytical framework and details the explanatory factors. Table 1 provides the theoretical justification for these explanatory factors, and Appendix A details the measurement scales used for the explanatory factors.

Based on previous research, we consider land dispossession, changing access to well-being resources, and livelihood adaptations as the primary mediators that shape the well-being outcomes in the villages affected by land acquisitions (Fig. 1) (Hall et al., 2015; Hufe & Heuermann, 2017; Oberlack et al., 2016; Zoomers & Otsuki, 2017).

## 4. Materials and methods

### 4.1. Methodology: archetype approach in global change and sustainability research

This paper applies the archetype approach (Eisenack, 2012) to identify recurrent effects of land acquisitions on human well-being. Within global change and sustainability research, the archetype approach is used to identify how recurrent configurations of factors and processes shape sustainable development outcomes across cases and contexts (Eisenack et al., 2019; Oberlack et al., 2016; Sietz et al., 2019). Archetypes can be identified as case typologies or as building blocks (Oberlack et al., 2019). As case typologies, archetypes organize cases into types. As building blocks, archetypes generalize evidence from cases into recurrent patterns in such a way that: (i) an archetype depicts specific recurrent effects that occur within cases; and (ii) a single case can be characterized by multiple archetypes (Eisenack et al., 2019). This paper utilises both forms of archetype analysis. First, comparative analysis of cases identifies pathways explaining effects of land acquisitions on well-being outcomes. Cases were considered units of

observation in exploratory comparison of quantitative survey data, and classified according to outcomes. Recurrent factors associated with the outcomes were investigated. Eighteen case-level pathways to well-being outcomes were identified. Following this, qualitative survey data added further insights by identifying and synthesizing archetypical processes as building blocks that explain connections between explanatory factors and outcomes across the pathways.

### 4.2. Data

Data are provided by the Quality of Investment Assessment (QI), a nation-wide Inventory on Land Concessions and Leases (LCI) in Lao PDR compiled in 2017 (Hett et al., 2018, 2020). These data cover all explanatory factors in Table 1, as well as changes in income, food security, and livestock. Appendix A details the variables, measurements, and sources. The data utilised is a complete set, consisting of 176 land acquisitions in 294 villages - hereafter referred to as "affected villages" in nine provinces. The data set includes all land deals in start-up and operational phases in these provinces, but omits deals that either did not start or ceased their operations. These deals were assessed for various quality aspects. Data collection was conducted over two consecutive campaigns. First, quantitative variables related to characteristics and spatial components of the land acquisitions were assessed. Next, qualitative data regarding implementation processes, impacts, and legal compliance were collected through group interviews. These interviews were conducted with households who did and did not lose land and had members who were and were not employed as a wage-labourer within land deals, as well as with company representatives and government authorities at the district level. Households were selected and interviews organized by village chiefs (Hett et al., 2018, 2020).

Approximately half of the 294 villages were affected by only one deal ( $n = 149$ ), while the remaining were affected by multiple deals (see Table B-1 in the Appendix). Land deals affected between one and 68 villages. In cases where a land acquisition affected multiple villages, approximately 30% of those villages were assessed (Hett et al., 2018).

A total of 246,981 ha across nine provinces were granted for the 176 deals, of which 170,000 ha were developed (see Table B-2 in the Appendix). In terms of granted area, the deals primarily invested in rubber, eucalyptus or acacia, sugarcane, and large livestock. The majority of investments originated from economically developing neighbour countries (see Table B-3 in the Appendix), followed by joint ventures between investors in Lao PDR and developed countries. The assessed deals were smaller than global average, with 55% of the deals covering an area less than 200 ha (Nolte et al., 2016). Only one-fifth ( $n = 36$ ) of the deals were granted area greater than 1000 ha.

Approximately two-thirds ( $n = 108$ ) of the deals were in the operational phase at the time of assessment, accounting for 113,401 ha of developed area, while the remaining ( $n = 68$ ; 55,317 ha) were still in the development phase. The deals were initiated between 1999 and 2017, with the majority beginning between 2004 and 2013 (68%;  $n = 199$ ).

### 4.3. Data analysis

Data analysis followed six steps:

**Step 1. Analysis of well-being resources and outcomes:** We categorized well-being outcomes and change of access to well-being resources in affected villages using descriptive statistics. This step provided the direction of changes (increased, unchanged, or decreased) in the three indicators of well-being outcomes, including food security status, income, and livestock production, and the six indicators of well-being resources, including access to farmland, NTFPs and wild animals,



**Table 1**  
Explanatory factors in pathways to well-being outcomes of land acquisitions.

Explanatory factors	Theoretical justification
<b>Characteristics of land acquisitions</b>	
Type of commodity	Different commodities require different levels of inputs including water, agrochemicals (Borras et al., 2011; Chiarelli et al., 2018; Johansson et al., 2016) and labour (Deininger & Byerlee, 2011; Hallam, 2009). Land acquisitions with inputs of higher environmental impacts or lower labour intensity are expected to lead to worse well-being outcomes (Kleemann & Thiele, 2015; Nolte & Ostermeier, 2017).
Land acquisition size	Larger-scale acquisitions consume more land and natural resources and may require higher inputs (e.g. agrochemicals). Although they may offer greater employment, they may also lead to greater land dispossession and environmental impacts (Andersson et al., 2016; Davis et al., 2014). The size of land acquisitions relates to villages in two ways: first, the number of villages affected by land acquisitions per deal and second, the number of deals per affected village.
Investor origin	Domestic investors may have a higher interest in developing their home countries than foreign investors (Oya, 2013). For instance, foreign investors often bring workers from their countries to develop land deals instead of hiring local labour (e.g. Baird et al., 2018), which may limit employment opportunities for affected villagers. Domestic investors are more likely to engage with affected villagers in land acquisition processes compared to the foreign ones (Hett et al., 2020). In this regard, foreign investments may lead to greater land and resource displacement. On the other hand, investors from economically developed countries may have a higher level of compliance with their home countries' regulations regarding responsible investment that may influence the land deal implementation processes, including impacts of agrochemicals on the local environment (Santangelo, 2018).
Type of investor	The typology of investors includes public, private, state-enterprise, and family businesses. They may affect well-being outcomes as their different levels of access to credit and accountability may influence implementation processes (Allee et al., 2015; Baird, 2020; Mulgan, 2000).
Phase of operation	Land acquisitions may generate new livelihood options through employment, which become visible once the land acquisition has reached its operational phase (Baird, 2011; Deininger & Byerlee, 2011). In some cases, employment effects are transient, as less labour-intensive operations in the operational phase replace more labour-intensive activities during the set-up phase (Nolte et al., 2016; Oberlack et al., 2016).
Mode of production	Land deals that establish outgrower schemes next to their land lease or concession may be more likely to result in better well-being outcomes in contrast to concession models. Under outgrower schemes, villagers may be able to keep their land-use rights as well as earn from partnership production (Cotula & Leonard, 2010; De Schutter, 2011).
<b>Implementation processes</b>	
Consultation and consent	Although participatory or inclusive development processes of land acquisitions rarely take place and villagers are often not free to influence decision-making (e.g., resist the land deals) in many countries due to political contexts (Baird, 2015; Borras & Franco, 2010; Colchester et al., 2013; Vermeulen & Cotula, 2010), how land acquisitions engage with affected communities and whether this is through a voluntary or coercive basis, is important for well-being (McCarthy, 2010). Space for genuine consultation and ensuring free, prior, and informed consent (FPIC) of all affected land users has the potential to mitigate negative impacts of land acquisitions (De Schutter, 2011; Titcher, 2017).
Environmental impact assessment (EIA) and monitoring	A proper EIA and monitoring may enable investors and government to identify appropriate mitigation measures to minimize adverse impacts (Hett et al., 2020; Titcher, 2017; von Braun & Meinzen-Dick, 2009).
Land dispossession	Land dispossession is a fundamental impact of land acquisitions (Hall et al., 2015). A significant loss of access to farmland may push villagers to give-up or reduce agricultural production, affecting their well-being through impacts on food security and income (Porsani et al., 2019; Yengoh & Armah, 2015).
Livelihood options or adaptation	Well-being outcomes depend on livelihood options that are available in the region after the land acquisition. This includes factors such as whether or not losses were adequately compensated (De Schutter, 2011; Franco, 2014), the ability of affected households to access new farmland, and their ability to engage in other development opportunities, such as off-farm or non-farm employment within and outside land acquisitions (Oberlack et al., 2016; Porsani et al., 2019; Yengoh & Armah, 2015). Well-being is adversely affected if better alternative livelihoods are not available (Busscher et al., 2019; Li, 2011).
Performance of land acquisitions	Poor performance of land acquisitions may create adverse well-being outcomes. In this case, affected households may have lost the control over land and associated resources without seeing substantive economic development materializing (Chilombo et al., 2019; Cotula et al., 2014). Moreover, poor performance of land acquisitions can be costly rather than beneficial for both investors and governments (Baird, 2020).
<b>Well-being resources</b>	
Access to farmland, NTFPs, wild animals, timber and firewood, and water for agriculture	Land and forests remain the main sources of food, income, and livelihood resilience for rural populations in many developing countries. This is especially the case in Lao PDR (Van Der Meer Simo et al., 2019). Losing access to these well-being resources thus has direct implications for well-being outcomes in affected villages.
Physical resources: Road access	Positive spillovers such as infrastructure improvement, new access to farming techniques, skills, inputs, and markets for agriculture may improve the well-being in the rural areas (Deininger & Byerlee, 2011; von Braun & Meinzen-Dick, 2009).
Human resources: technology or skills transfer	
<b>Environmental impacts</b>	
Impacts of agrochemicals and changes in water level and quality in nearby rivers and streams	Environmental contamination such as from agrochemicals is one of the main impacts of land acquisitions that has a direct impact on well-being (Busscher et al., 2019; Friis & Nielsen, 2016; Rulli et al., 2018). In addition, many land acquisitions have effects on surrounding bodies of water through usage for irrigation or pollution from land clearance or chemical use (D'Odorico et al., 2017; Johansson et al., 2016).
<b>Socio-ecological contexts</b>	
Accessibility	In Lao PDR, accessibility is a primary determinant of well-being outcomes. The availability of well-being resources and accessibility to markets and services vary widely across geographical regions (Coulombe et al., 2016; Epprecht et al., 2008).
Previous land use	The previous use of land granted for acquisitions may influence the well-being outcomes. For example, granting land previously used for food production by villagers may have greater negative impacts on well-being than granting truly unused land (Edelman, 2013; Oberlack et al., 2016).
Land tenure security	Because land acquisitions most likely target the areas without official land tenure (Cotula, 2014; Diergarten, 2019; Nolte et al., 2016), strong land tenure security could play an important factor in preventing land dispossession.

timber and firewood, water for agricultural production, technology or skills transfer, and road access improvement. The direction of change was based on villagers' perceptions. Villagers were asked during interview whether a respective indicator relating to well-being outcomes and well-being resources increased, unchanged, or decreased compared to the time before the establishment of a land acquisition in the village.

**Step 2. Well-being resources and outcome patterns:** Using the criteria of Table 2, we then classified the well-being outcomes of all 294 villages into four patterns according to the direction of change in well-being. Pattern 1 covers cases of enhanced well-being, pattern 2 describes cases without changes in well-being, pattern 3 comprises villages that experienced adverse changes in well-being, and pattern 4 entails cases of trade-offs between indicators. Changes in well-being resources were classified into the same patterns.

**Step 3. Identifying pathways to well-being outcomes:** We identified the archetypal pathways to well-being outcomes using Formal Concept Analysis (FCA). FCA is a set-theoretic methodology for comparative analysis of cases, and a method for qualitative knowledge representation and inference (Ganter & Wille, 2012). According to Oberlack et al. (2016, p. 157), the "input is a table of models (called objects) and their binary attributes (presence/absence of factors, process, and outcome in the model). FCA generates a concept lattice and compiles logical implications between attributes. The concept lattice organises the attributes in a hierarchical structure such that higher-tier attributes are logical implications of lower-tier attributes, while lower-tier items show distinct combinations with higher-tier attributes in the dataset." While Qualitative Comparative Analysis (QCA) is most appropriate for identifying necessary and sufficient causes of an outcome (Schneider & Wagemann, 2012), FCA is particularly suited to identifying recurrent patterns in the factors associated with an outcome (Ganter & Wille, 2012; Oberlack et al., 2016; Oberlack & Eisenack, 2018). The latter is the purpose of this study.

For each of the four outcome patterns  $O_x$  (with  $x = 1 \dots 4$ ) from step 2, we identified consistent and recurrent factors associated with each outcome  $O_x$  through FCA on the recognition of land dispossession, access to resources, and livelihood adaptations as central mediators for well-being outcomes (as discussed in Section 3.2). We first partitioned the cases with  $O_x$  based on the degree of land dispossession, given the significance of land access for well-being. Next, we identified distinctive sub-patterns by partitioning cases according to the change in access to well-being resources and livelihood options or adaptation. Finally, we note the frequency and consistency of all factors and processes

associated with  $O_x$ , including characteristics of land acquisitions, implementation processes, access to well-being resources, environmental impacts, and socio-ecological contexts. We applied a threshold of at least 10% frequency and 50% consistency for factors associated with  $O_x$ , meaning that if explanatory factor A holds in 10 out of 20 cases of  $O_x$ , and explanatory factor B holds in 8 of the 10, then the relative frequency of A is 50% and the consistency with explanatory factor B is 80%. This step revealed 18 archetypal pathways to well-being outcomes.

**Step 4. Comparing pathways to reveal contrasting factors:** Next, we compared pathways to identify the factors that create differences between the 18 pathways. We noted differing factors that led to the same outcome. Then, we compared pathways with the same single factor but different outcomes to identify co-occurring factors that could explain how similar factors can lead to different outcomes.

**Step 5. Verification:** We verified the FCA results by triangulating them with the qualitative responses of our survey in the affected villages. We utilized responses to the following questions: Why did overall food security improve or decrease since the land acquisition was established in the village? How has rice production changed? How did food from nature change? How has money for food changed? Why did income increase or decrease compared to the time before the establishment of a land acquisition in the village? Why did the amount of livestock change compared to before the establishment of a land acquisition in the village? This verification confirmed the FCA results, and added qualitative understanding to the identified effects.

**Step 6. Synthesis:** To synthesize archetypal processes that explain how and why well-being evolves differently across villages, we first mapped the contrasting factors (from step 4) into an influence diagram. We then conducted a thematic analysis of the qualitative data (from step 5) to identify archetypal processes that lead to a particular well-being outcome, identifying the contrasting factors that influence each process. Finally, we weighted the degree of these influences based on their frequency and consistency. The degree of influence is illustrated by the thickness of the arrows in the influence diagram.

#### 4.4. Limitations

Results of this study should be interpreted in view of the following limitations. First, our precise results are shaped by the partitioning in step 3, which was based on the current state of knowledge demonstrating the significance of access to land in villages affected by land acquisitions (Hall et al., 2015; Oberlack et al., 2016), well-being

**Table 2**  
Classification matrix of well-being patterns.

A). Well-being outcome patterns						
Well-being outcome patterns	Change in well-being outcome dimensions					
	Food security		Household income			Livestock
1. Enhanced well-being	Increased or same		At least one aspect increased and no decreased			Same
2. Unchanged well-being	Same		Same			
3. Adverse well-being	Decreased or same		At least one aspect decreased and no increased			
4. Trade-off between well- being outcome dimensions	Increase		At least one aspect decreased			
	Decreased		At least one aspect increased			
B). Well-being resource patterns						
Well-being resource patterns	Change of access to well-being resources					
	Access to farmland	Access to NTFPs and wild animals	Access to timber and firewood	Access to water for agriculture	New technology or skill transfer	Provision of road improvement
1. Improved	At least one aspect increased and no decreased				At least one type of technology or skills transferred to villagers or improved road access was provided	
2. Unchanged	Same	Same	Same	Same	None	No
3. Adverse	At least one aspect decreased and no increased				None	No
4. Trade-off between well-being resources	At least one aspect increased and decreased or new technology and skill transferred to villagers or improved road access was provided					

resources, and options for livelihood adaptations. Partitioning the factors differently, e.g. starting with origin of investor, could change the precise number and narratives of the pathways, but the overall insights would remain the same. Second, we measured changes in well-being using three indicators for well-being outcomes and six indicators for well-being resources. Our data do not allow us to draw conclusions about changes in subjective well-being, and the village scale implies that our data does not cover intra-village variation (Llopis et al., 2020). These are important areas for future research. Thirdly, rural livelihoods in developing countries, including Lao PDR, are complex and are influenced by various factors. While this study focuses on significance of land acquisitions to well-being, we do not argue that it represents a complete picture of concurrent drivers of livelihood change. Other important drivers include improvement and expansion of infrastructure, increasing non-farm employment in the nearby towns, and climate change.

## 5. Results

### 5.1. Human well-being outcomes and access to resources in villages affected by land acquisitions

#### 5.1.1. Well-being outcomes

Fig. 2-A presents the changes in food security, income, and livestock in affected villages since the establishment of land acquisitions. Food security in 124 (42%) villages decreased, remained unchanged in 119 (40%) villages, and increased in only 51 (17%) villages. Income decreased in 51 villages, remained unchanged in 74 villages, and increased in nearly two-thirds of villages ( $n = 169$ ). Livestock

production decreased in nearly two-thirds of villages ( $n = 168$ ), remained unchanged in 58 villages, and increased in 68 villages.

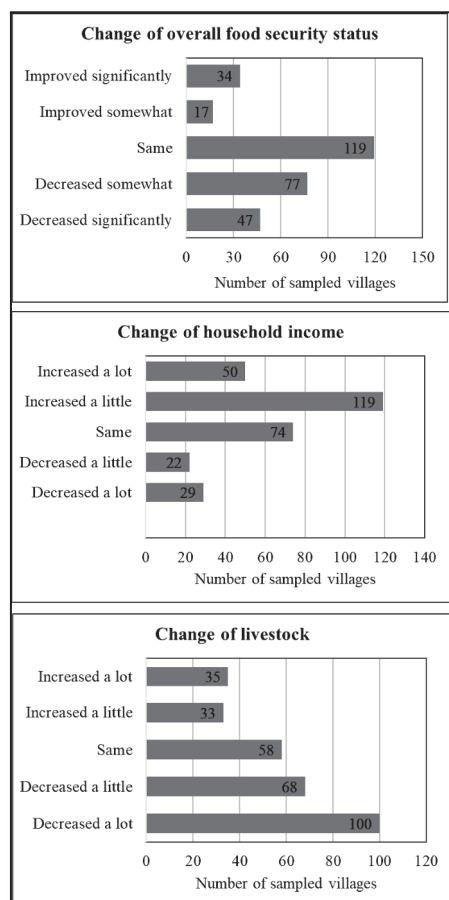
These villages experienced diverse combinations of changes in food security, income, and livestock production (Fig. 2-B). In 16% ( $n = 47$ ) of affected villages, income increased but villagers still experienced a decrease in food security and livestock. Increases in all three well-being indicators were reported by only 9% ( $n = 26$ ) of the affected villages. Eleven percent ( $n = 33$ ) of the villages experienced a decrease in all three indicators. No change in all well-being outcomes was reported in 22 villages.

Taken together, most of the affected villages (37%,  $n = 110$ ) experienced trade-offs between well-being outcomes, followed by villages with purely adverse impacts on well-being (31%,  $n = 92$ ). Roughly one-fourth of the villages experienced enhanced well-being in one or more dimensions ( $n = 70$ ), and another 7% ( $n = 22$ ) saw no changes in their well-being outcomes.

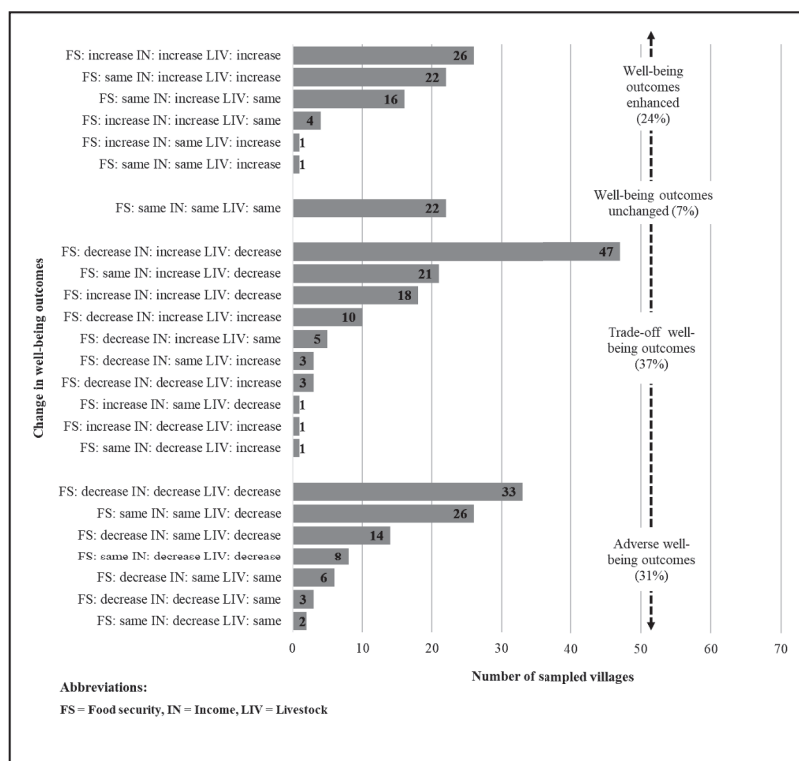
#### 5.1.2. Access to well-being resources

More than two-thirds of the affected villages ( $n = 193$ ) experienced decreases in access to farmland (Fig. 3-A), with access improving in only 21 villages. Access to NTFPs and wild animals decreased in more than two-thirds of villages ( $n = 235$ ); around one-fifth ( $n = 59$ ) reported no change. A decrease in access to timber and firewood was also mentioned by approximately two-thirds of the affected villages ( $n = 231$ ). Access to water for agriculture decreased for more than half of the affected villages ( $n = 154$ ), whereas 134 villages saw no change.

Investors did not commit to improving road access in the majority of affected villages ( $n = 226$ ). However, in the cases where road access improvements were pledged ( $n = 68$ ), only 38% of villages ( $n = 26$ )



A) Change in well-being outcome dimensions



B) Concurrent changes of well-being outcome dimensions

Fig. 2. Changes of well-being outcomes in affected villages since the establishment of land acquisitions.

reported improvements at the time of the assessment. Most villages ( $n = 246$ , 84%) reported that no new technology or skills were transferred along with the land acquisitions. Only 19 villages reported that new technology and/or farming techniques were introduced.

In terms of concurrent changes in the six well-being resources, around one-third of the affected villages ( $n = 96$ ) experienced the decrease of access to farmland, NTFPs and wild animals, timber and firewood, and water for agriculture without improvements in road access, new technology, or skills (Fig. 3-B). Another 15% ( $n = 43$ ) of affected villages reported that although water access was unchanged, other resources decreased and road access improvements and new technologies or skills were not provided. Only 11% ( $n = 32$ ) of the affected villages claimed that there was no change in access to well-being resources.

Taken together, the majority of affected villages (68%,  $n = 202$ ) experienced losses in one or more aspects of well-being resources, and another one-fifth ( $n = 59$ ) faced trade-offs. Only a small number of villages (11%,  $n = 33$ ) report no changes, while no village experienced a consistent improvement in well-being resources.

## 5.2. Archetypal pathways to well-being outcomes

We found 18 distinctive pathways to well-being outcomes, i.e. sets of factors that are associated with particular well-being outcomes. Three pathways improved well-being outcomes, occurring in 21% of the sampled villages ( $n = 61$ ). Two pathways, affecting 5% ( $n = 15$ ) of villages, left well-being outcomes unchanged. Five pathways led to adverse well-being outcomes, occurring in 28% ( $n = 83$ ) of villages. Eight pathways involved trade-offs among different dimensions of well-being outcomes, occurring in 33% ( $n = 98$ ) of villages. Fig. 4 provides a full overview of the pathways. We describe them in turn.

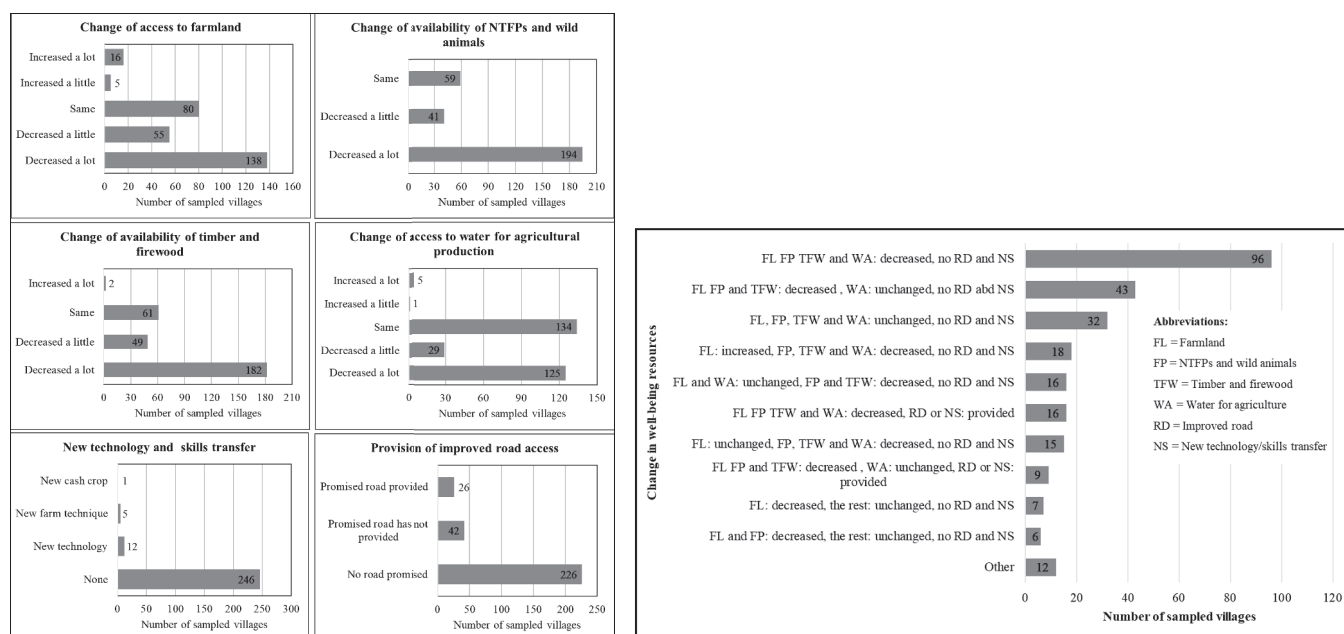
### 5.2.1. Pathways to enhanced well-being

Three different pathways enhanced well-being (Fig. 4-A, and Table C-1 in Appendix C). The first pathway ( $n = 19$ ) occurred in villages that experienced the creation of small-scale domestic family livestock concessions. Most of these are still in the development phase at the time of assessment. Due to the presence of formal land titles in many villages,

there was no reported land dispossession or natural resources displacement. FPIC was sought during the land granting process. Villagers reported participation in negotiating the land deals. Additionally, negative environmental impacts were absent in this pathway. The qualitative data showed that increases in income were primarily derived from livestock, as villagers gained better access to pasture land.

The second pathway ( $n = 18$ ) is rooted in the existing accessibility of villages that enabled access to development opportunities. This accessibility outweighed the negative impacts of land deals in these villages. Many villages that experience this pathway were located near their respective provincial capitals, benefitting from better market access to pursue commercial crop and livestock production. Although land titles prevented land dispossession, land deals adversely affected access to other well-being resources such as farmland, NTFPs and wild animals, timber and firewood, and water for agriculture without providing improvements in road access and new technology or skills. Since these resources were of limited significance for livelihoods in these particular villages, the positive well-being effects of the proximity to markets outweighed the negative impacts of the land acquisitions. Qualitative data revealed that the losses in well-being resources and water resulted in decreased food provision from nature, but alternative income sources compensated for the losses by providing access to food markets. Furthermore, many villages claimed that the main drivers for increases of food security, income, and livestock production were better market access, employment opportunities outside of the land acquisitions, agricultural production, and commercial livestock production.

All villages that experience the third pathway to enhanced well-being ( $n = 24$ ) report that they lost land and access to resources to a small degree. Many of them were able to compensate for these losses by gaining access to new farmland elsewhere, engaging in employment, or negotiating for other benefits with investors. Many villagers compensated for the decrease in availability of food from nature through access to food markets. The main reported drivers for improved food security status in this pathway include better market access, better access to new technology enabling villagers to shift to commercial livestock production, and increased income from employment within and outside the land acquisitions.

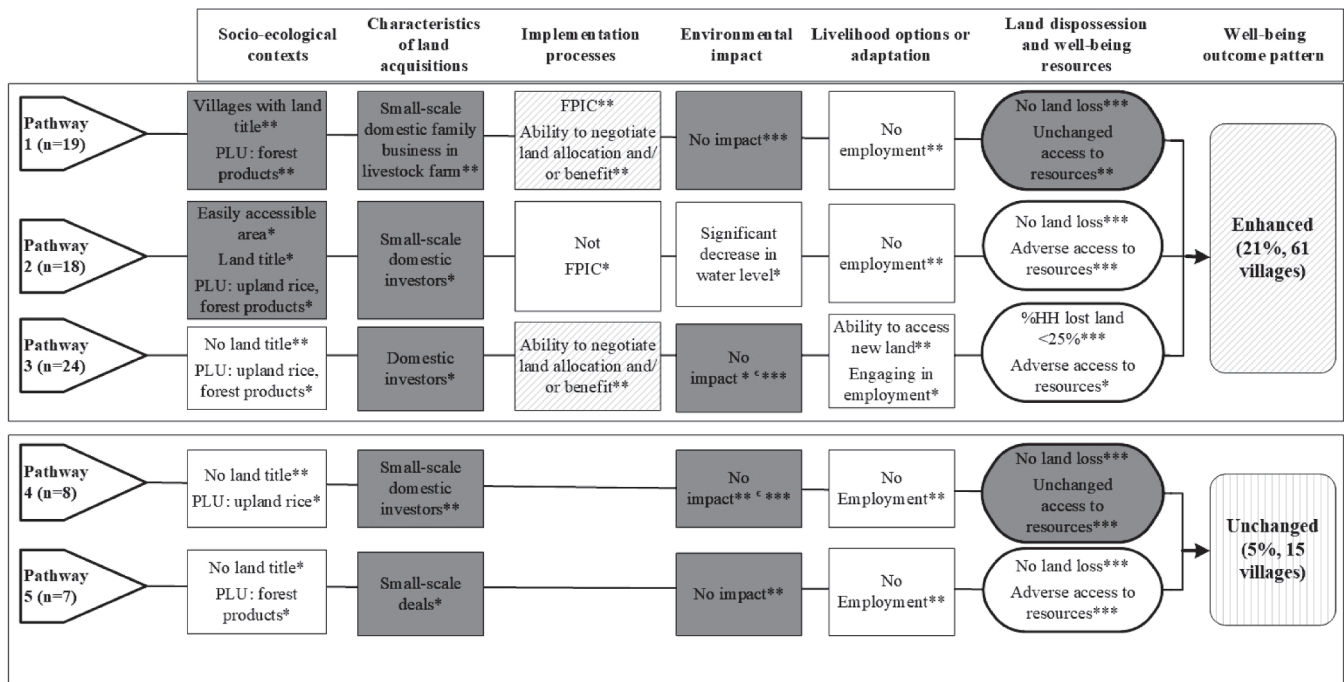


A) Change in well-being resources

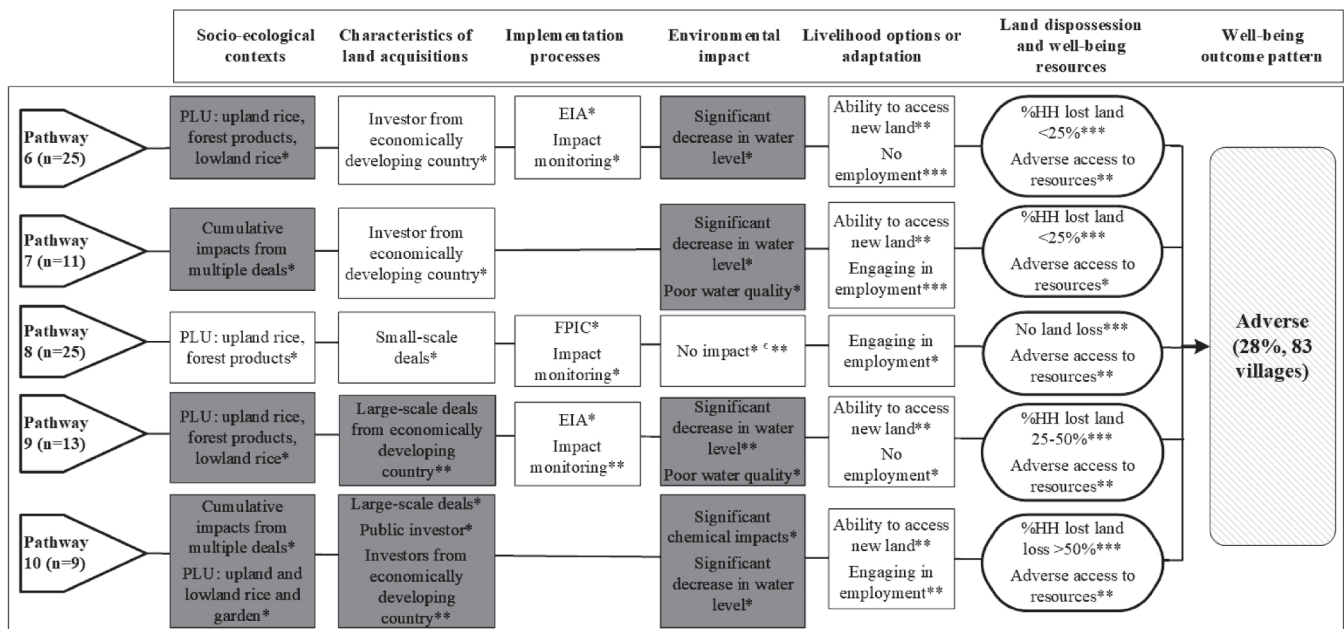
B) Concurrent change of well-being resources

Fig. 3. Changes in access to well-being resources in affected villages since the establishment of land acquisitions.





#### A) Pathways to enhanced and unchanged well-being outcomes



#### B) Pathways to adverse well-being outcomes

**Fig. 4.** Pathways to well-being outcomes. Note: These archetypal pathways represent the pathways to impact in 87% (n = 257) of all villages based on the criteria for consistency and frequency. The remaining thirty-seven cases did not meet the frequency and consistency thresholds to be considered pathways.

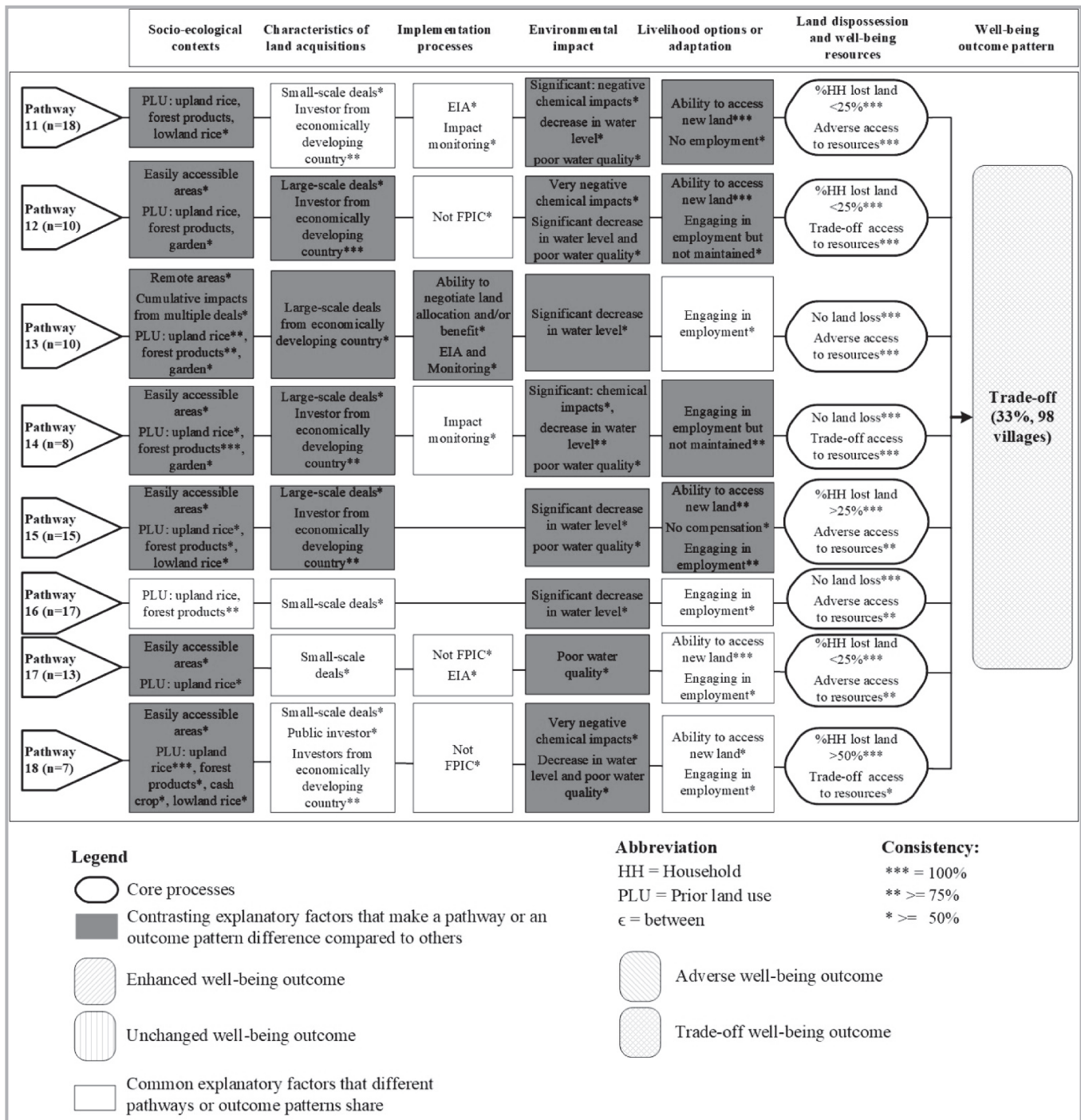
##### 5.2.2. Pathways to unchanged well-being

The two pathways to unchanged well-being share similar factors (Fig. 4-A: pathway 4 (n = 8) and 5 (n = 7) and Table C-1 in Appendix C). Interactions between villagers and investors were minimal. Villagers experienced neither land nor natural resource displacement, nor benefits in employment of spillovers from the land acquisitions. The pathways differ in terms of access to well-being resources. In pathway 5, access to resources was adversely affected and the availability of food

from nature decreased, but these effects were of limited importance to livelihoods in these particular villages.

##### 5.2.3. Pathways to adverse well-being

There are five pathways through which land acquisitions generate purely adverse impacts on human well-being (Fig. 4-B and Table C-2 in Appendix C). A commonality between each of these pathways is that all villages experienced adverse impacts on well-being resources. The



### C) Pathways to trade-offs between well-being outcome dimensions

Fig. 4. (continued).

pathways differ in terms of the extent of land dispossession, livelihood adaptations, environmental impacts, implementation processes, size of land acquisitions, and prior land uses.

Villages that experience pathway 6 (n = 25) saw a small proportion of land dispossession, adverse impacts on well-being resources, and no employment generated for villagers. Although many households were able to access new land, the new land areas were insufficient to compensate for the losses, differing in size, quality, and geographic location. This has a significant impact on villagers' ability to produce food, especially low- and upland rice that is vital to food security.

Additionally, decreased water levels in the surrounding rivers and streams negatively affected well-being in these villages.

Similar dynamics were observed in pathway 7 (n = 11). Villagers also lost small proportions of land, and many households were able to access new land. However, >10 land deals affected these villages, accumulating impacts, particularly adverse effects on well-being resources and water in surrounding rivers and streams. New and widespread employment opportunities in these villages were not sufficient to compensate for these adverse well-being impacts.

Pathway 8 (n = 25) differed substantially from the others. These

villages did not experience land dispossession since FPIC was sought. Despite the FPIC procedures and secured land access, well-being outcomes were still negatively impacted in these villages due to reduced access to well-being resources.

Pathway 9 ( $n = 13$ ) featured acquisitions of particularly large size. A significant share of households lost land, but no local employment was generated by the land acquisitions. Although many households were able to access new land, the new areas were insufficient to compensate for the losses, differing in size, quality, and geographic location. This significantly impeded on villagers' ability to produce food, especially low- and upland rice. These villages also experienced significant decreases in water levels and quality in nearby rivers and streams caused by the land deals.

Finally, pathway 10 ( $n = 9$ ) describes trajectories in villages that experience cumulative impacts of multiple deals and who are affected by deals of particularly large size. These factors resulted in widespread land dispossession and negative effects from agrochemical and water impacts in surrounding rivers and streams. Villages lost access to land for important uses, such as low- and upland rice fields as well as gardens that villagers used for food and income production, while only limited employment opportunities were made available to villagers.

The qualitative data from these villages revealed that the decrease in food security was driven by decreases in both rice production and food from nature, triggered by farmland and resource enclosures, chemical contamination, population increases, and climate change. Income decreased in these villages due to the loss of income opportunities from forest products or agricultural commodities. Livestock production also decreased due to pasture land displacement, disease, and chemical contamination.

#### 5.2.4. Pathways to trade-offs between food security, income, and livestock

Trade-offs between impacts on food security, income, and livestock was the most frequent outcome pattern. There are eight pathways leading to trade-offs (Fig. 4-C and Table C-3 in Appendix C). Villages across these pathways lost access to land, well-being resources, or both.

The eight trade-off pathways differ in terms of the proportion of affected households. All pathways experienced adverse environmental impacts to varying degrees. The eight pathways experienced different combinations of gaining access to new land and employment. Further noticeable differences between pathways are observed in the qualitative data.

First, pathways 11–15 occur in villages that experienced increased income but decreased food security and livestock production ( $n = 61$ ). The main drivers reported for the decrease of food security were the dispossession of farmland and resources that villagers relied on for food, chemical contamination, deforestation, and climate change. Livestock production decreases were due to pasture enclosure, chemical contamination, and disease. By contrast, employment opportunities outside and within land acquisitions, commercial agricultural production, and livestock production and trade were key factors for the increase in income. However, the increased income from non-traditional sources (e.g. outside smallholder agricultural production and collecting forest products) was unable to improve food security.

Second, food security and income increased but livestock production decreased in pathways 16–18 ( $n = 37$ ). In these settings, villagers reported that their food security improved through better access to the food market and agricultural expansion. Income increases were due to salaries in public administration, hired labour outside and within land acquisitions, broader availability of development opportunities, and agricultural production. Disease, pasture enclosure, and chemical contamination were the main drivers for the decrease of livestock production.

## 6. Discussion

### 6.1. Archetypical processes shaping human well-being in land acquisition contexts

Based on our chosen thresholds for a consistent and recurrent factor as explained in step 3 in Section 4.3, land acquisitions affect well-being outcomes through 18 distinct pathways. Different partitioning factors may not only change the precise number of pathways but also lead to other possible pathways as explained in Section 4.4. This result is based on an archetype analysis that generates a typology of cases (here: villages), since each village experiences exactly one pathway. These pathways demonstrate configurations of factors and outcomes that are recurrent and consistent across villages. They do not yet, however, systematically explain the processes through which the factors affect well-being. As noted, archetype analysis offers an approach to identify such processes by decomposing cases into building blocks. This approach, “decomposes each case into distinct components such as processes or causal mechanisms, which may operate simultaneously and together explain the dynamics or outcomes observed in that case” (Oberlack et al., 2019, p. 4).

Based on the comparison of the 18 pathways and the qualitative insights in step 6 of our methodological procedure, we identify five building blocks, i.e. archetypical processes, that explain how and why human well-being evolves better in some affected villages than in others. These processes are: (i) shifting access to land and natural resources; (ii) commercialization of agriculture; (iii) availability of development opportunities in the region; (iv) environmental impacts; and (v) employment opportunities within and beyond land acquisitions.

Fig. 5 illustrates the factors associated with each process. Further, the influence of these processes on well-being is contingent on the resource-dependency and portfolio of livelihood options in the affected villages. If livelihoods depend largely on land and natural resources, villages are more likely to suffer more from displacements caused by land acquisitions than villages whose livelihoods are more engaged in non-farm activities. Simultaneously, these processes also directly shape livelihood portfolios in the affected village.

#### 6.1.1. Shifting access to land and natural resources

Our results clearly indicate that land acquisitions that displace villagers from land, almost always lead to adverse impacts on well-being. Well-being may be maintained or possibly enhanced in villages where there is no land or natural resource displacement, the value of the displacement is insignificant to villagers' prior livelihoods, or the villagers are able to continue agricultural or livestock production for subsistence or market purposes on suitable land. These effects are found in pathways 1–5. In rural areas, villagers may not be in the same status and position to access resources, and development opportunities (Rigg, 2006, 2016). Therefore, further in-depth study is needed to investigate whether land acquisitions create winners and losers within villages (Busscher et al., 2019; Gironde et al., 2014; Kuusaana, 2017; Porsani et al., 2017). The results also show that while some villagers gain access to new land, this land is often not adequate to compensate for losses in terms of quality, size, or geographical location. This may especially be the case if the new land was previously “unused or underused”, which are not suitable for farming, remote, or require higher inputs (McCarthy et al., 2012; Oxfam, 2011).

The process of enhanced well-being is influenced by three factors. First, this depends on the land tenure security in the affected villages. Pathways 1 and 2 demonstrate that land titles have enabled villagers to negotiate deals to protect their claims, resulting in no land dispossession and less significant natural resource displacement. However, land acquisitions in Lao PDR often occur in areas without land titling (Dwyer, 2017; Hirsch, 2011). Second, the degree of land and natural resource displacement is not only related to the size of deals as suggested by previous studies (Andersson et al., 2016; Davis et al., 2014) but also to



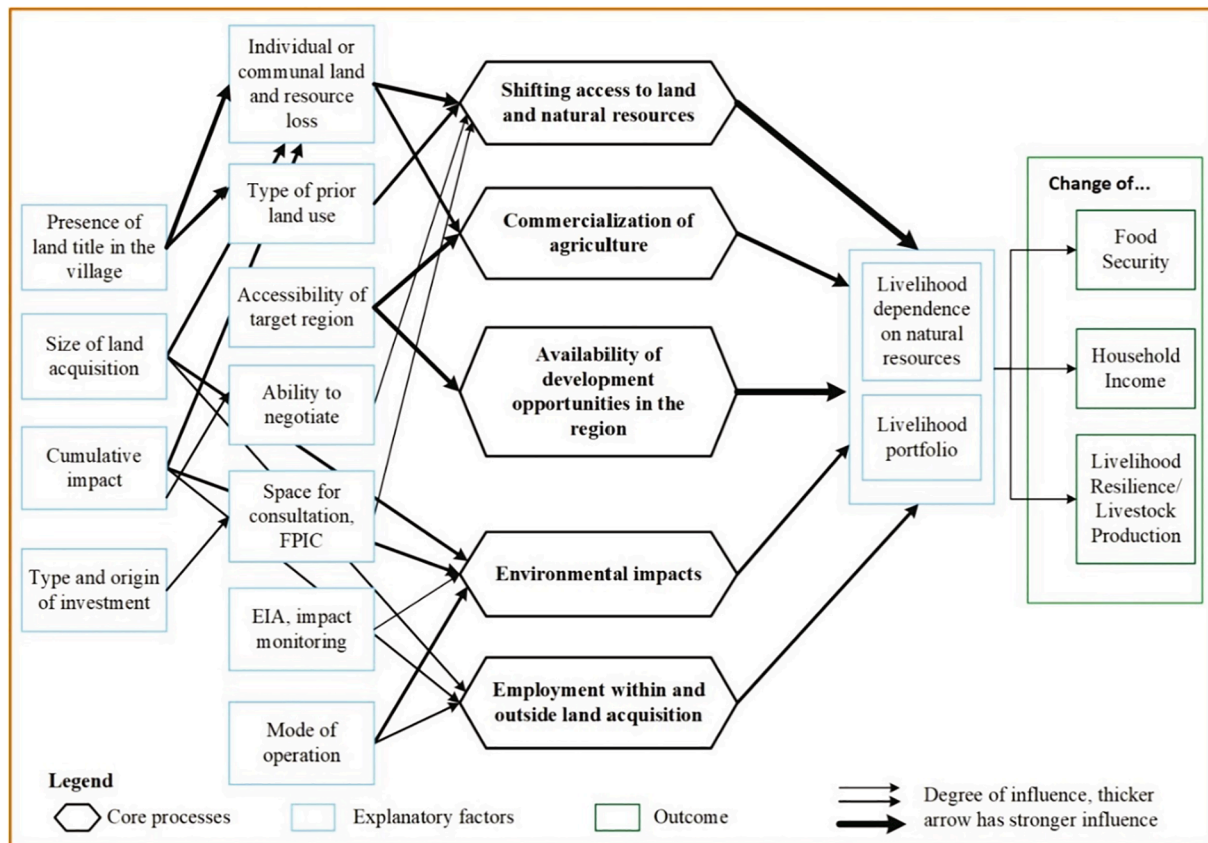


Fig. 5. Influence diagram of archetypal processes shaping human well-being outcomes in villages affected by land acquisitions.

the cumulative impacts of multiple deals within a village. This accumulation can amplify adverse well-being effects, as seen in pathways 7, 10, and 13. Third, our findings indicate that FPIC does not guarantee enhanced well-being outcomes as claimed by some international organizations (FAO, 2012a; von Braun & Meinzen-Dick, 2009), supporting the argument that outcomes of land acquisitions are not only shaped by whether or not the FPIC has been sought, but rather that they change over time along the business cycle (Franco, 2014; Nanthavong et al., 2020; Vermeulen & Cotula, 2010). Although the FPIC principle is not widely applied in many countries restricted by the political context (Baird, 2015; Borras & Franco, 2010; Colchester et al., 2013; Vermeulen & Cotula, 2010), we find that providing space for consultation and seeking FPIC plays an essential role in preventing land dispossession and enhancing the ability to negotiate for land allocation or other benefits such as in pathways 1 and 8.

#### 6.1.2. Commercialization of agriculture

Our results suggest that accelerating commercial crop or livestock production is among the most important processes for improved household income in the affected villages. Agricultural commercialization is a simultaneous process of change, independent from land acquisitions in the majority of villages that experienced enhanced well-being. Greater accessibility of the affected region is a key factor enabling such commercialization. Areas with closer proximity to the

provincial capital have better access to input and output markets, allowing farmers to pursue commercial crop and/or livestock production. The resulting increase in income enables villagers to improve their food security through the food market supply, such as in pathways 2, 3, and 11–18. Our results further suggest that provision of improved road access and new technology or skills transfer by investors increases the degree of villagers' engagement in commercial agriculture, demonstrated in pathways 12, 14, and 18. This supports previous findings of these provisions' role in agrarian transitions (e.g. Ahmed et al., 2019; Porsani et al., 2017; Widianingsih et al., 2019). While proponents have expected land acquisitions to foster such infrastructure development (Deininger & Byerlee, 2011; von Braun & Meinzen-Dick, 2009), we found that investors provided improved road access in only a small number of villages ( $n = 26$ , 9%). Further, our results indicate that commercialized agriculture was less likely to be taken up by villagers in cases that resulted in land dispossession, new land was not provided, or the new land was not comparable in the size or quality. In these cases, the land acquisitions do not only impact villagers adversely, but investors and government also lose, which supports Li's statement that, "[t]ransnational farmland investments in much of the Global South are risky for all parties involved: agribusiness firms and their financial backers; host-country governments; and the people on the spot" (Li (2015, p.560). Baird calls this as "lose-lose-lose" scenarios (2020, p. 404).



### 6.1.3. Availability of development opportunities in the region

Our results reveal that villagers were able to enhance their well-being in cases located near the provincial capital. This proximity offered access to a wide range of development opportunities for livelihoods, business, and trade, including and beyond the commercialization of agriculture. This archetypical process was observed in pathways 2, 12, 14, 15, 17, and 18. Food provision through markets played an important role in improved food security of these villages. This aligns with the overall development patterns in Lao PDR, in which better living standards are observed in urban, lowland areas (Coulombe et al., 2016; Epprecht et al., 2008).

### 6.1.4. Environmental impacts

One of the primary drivers of decreased well-being in the sampled villages is environmental pollution from agrochemicals such as fertilizers, pesticides, and herbicides, and their impact on decreased water levels and quality in nearby rivers and streams. Numerous villagers reported that household income decreased due to chemical contamination affecting the availability of food from nature, water for consumption, and pasture for livestock. Environmental impacts are consistently associated with two factors. First, the mode of production applied by the investors determines the level of agrochemical usage and their spillover effects to rivers and streams, as seen in pathways 6, 11, 16, 17, and 18. Second, the size of the deal and the cumulative impacts in cases of multiple deals influence the degree of experienced environmental impacts, in particular in pathways 7, 9, 10, and 12–15. We found that the negative impacts of agrochemicals and water impacts are most likely to occur with large-scale deals or cumulative impacts of multiple deals. This result from Lao PDR aligns with similar findings from Chile (Andersson et al., 2016) and provides evidence for global assessment models (Davis et al., 2014).

It has previously been argued by bodies such as the FAO that EIA prior to and monitoring throughout a land deal has the potential to minimize and mitigate environmental impacts (FAO, 2012a; FAO et al., 2010). On the contrary, our results show that the environmental impacts do not differ between cases with and without EIA. This finding supports arguments that EIA is not effective in ensuring environmental protection, but rather that EIA can be completed simply to satisfy decision-makers. Currently, EIAs appear to have a limited role and impact in the project planning process (Jay et al., 2007), and do not take into account of cumulative impacts across land acquisitions and other development activities such as hydropower development, mineral extraction, etc. (Baird & Barney, 2017).

### 6.1.5. Employment opportunities within and outside land acquisitions

Our findings suggest that employment generated by land acquisitions can become an important source of cash income for villages. However, these opportunities alone cannot enhance well-being or compensate for land and natural resource dispossession. Employment opportunities outside deals, including off-farm and non-farm jobs, are more consistently associated with improvement of incomes, such as in pathways 2, 3, and 10–18. In general, in cases with adverse well-being outcomes, villagers claimed that there were limited or no employment opportunities within or outside deals. Employment generated by deals is not only affected by the mode of operation and their labour intensity (Deininger & Byerlee, 2011; Kleemann & Thiele, 2015) but also by size of deals or cumulative impacts of multiple deals in the village. Larger and multiple deals in a village tend to be associated with a higher total number of jobs. However, larger and multiple deals are more likely to

cause displacement, leaving villagers unable to continue traditional livelihood systems.

## 6.2. Six policy entry points on human well-being in land acquisition contexts

The majority of assessed land acquisitions affected human well-being adversely or through trade-offs. In a limited number of villages, well-being increased despite the presence of land acquisitions. Illustrated in the influence diagram (Fig. 5), we point to six policy entry points to improve human well-being in villages affected by land acquisitions.

First, these results discourage land acquisitions in contexts of low land tenure security. Only recognized, secured land rights can ensure sufficiently strong bargaining power for those whose well-being is most at stake in land acquisitions. This is a strong call for caution, as large-scale land acquisitions have targeted areas of low tenure security across the Global South (Cotula, 2014; Diergarten, 2019; Ndi, 2019; Nolte et al., 2016). Land tenure in rural areas is often weak and informal (Cotula, 2014; Dwyer, 2017) and formalization of tenure involves its own set of challenges and risks (Dwyer, 2015). Additionally, land granting processes should ensure that there is space for consultation and acquisition of FPIC, so that affected villages can negotiate for land allocation and/or benefits from deals. This requires strong and accountable community leadership (Baird, 2017; Hall et al., 2015).

Second, consistent adverse effects discourage large-scale deals and multiple deals in individual villages. Pathway 1 shows well-being can be enhanced in cases of small-scale deals. However, the enabling factors for this pathway are exceptionally narrow. It is almost impossible to avoid displacement of access to land or well-being resources, as local livelihoods rely on most of the land for one purpose or another (Hilhorst & Zoomers, 2012; Zoomers & Kaag, 2014). Well-being can increase in the early years of small-scale deals in which land and natural resource displacement was not significant and adequately compensated for, and environmental impacts were minimal. Such “absence of dispossession” (Hall et al. 2015) is reflected in pathways 1 and 4. However, small-scale deals can still trigger adverse impacts and is not a sufficient factor for positive impacts (Baumgartner et al., 2015; Friis & Nielsen, 2016). Strong land tenure security remains an essential precondition for enhanced well-being, even in the context of small-scale deals.

Third, the mode of operation is a consistent predictor of well-being impacts, discouraging land acquisitions utilizing agricultural practices with low labour intensities or high environmental impacts.

Fourth, FPIC and EIA are confirmed as important procedures to strengthen the voice of land users, but they must not be misconstrued as a guarantee of positive well-being effects. Further, because adverse impacts are more prevalent in cases affected by multiple deals, cumulative impact assessment should be taken into consideration in land acquisition granting processes.

Fifth, environmental degradation such as chemical contamination from large-scale farming operations and smallholder agricultural production, is one of the main threats to well-being in rural areas. Adverse impacts in the medium- or long-term are likely without environmental safeguards and controls on chemical use.

Sixth, pathways 2–3 demonstrate that better alternative development opportunities can overcome well-being losses associated with land acquisitions, if losses are limited. Villagers are able to improve their income and food security in contexts where the region is easily accessible and livelihoods are not solely dependent on land and natural resources. Improvements come from engagement in commercial

agriculture, employment within and outside land acquisitions, and other opportunities such as trade. These findings are supported by other studies in Lao PDR and in the region (Manivong et al., 2014; Rigg, 2007; Rigg et al., 2016). This finding indicates that policy should focus on sustainable development strategies beyond, rather than within, large-scale land acquisitions. Agricultural production in line with principles of agroecology and solidarity economy (Altieri, 2018; FAO, 2015) might provide one such alternative strategy for sustainable development.

## 7. Conclusion and recommendations

Using a unique, national-scale comprehensive dataset on characteristics, implementation processes, and impacts of land acquisitions in Lao PDR, this study investigated the effects of land acquisitions on human well-being at village level. In contrast to narratives of “global land grabs” that do not recognize case-specific differences, the results demonstrate that the land acquisitions in our sample influence human well-being through 18 distinctive pathways, ranging from enhanced, unchanged, adverse, and trade-offs in well-being outcomes. Five archetypical processes explain linkages between factors and well-being outcomes. The clear majority of land acquisitions trigger trade-offs or adverse impacts. Enhanced well-being only occurred in a small number of villages, and arises only under specific, narrow preconditions, or through concurrent change processes unrelated to land acquisitions. The archetypical processes reveal six entry points for policy to enhance human well-being in villages affected by land acquisitions in Lao PDR.

Land-based investments are part of national development strategies in many countries worldwide. Since our results are based on data from Lao PDR, we cannot ascertain the empirical validity of our results elsewhere. However, the general observation that land acquisitions affect well-being through multiple pathways to impact will most likely hold elsewhere (cf. e.g. Oberlack et al., 2016; Dell’Angelo et al., 2017b). This calls for nuances to land investment narratives and governance arrangements that are lacking awareness of the factors that explain how and why a land acquisition affects well-being in a particular way. Furthermore, our results in Figs. 4 and 5 point to explanatory factors that are observed in many parts of Asia, Africa, South America, and Europe, nurturing the hypothesis for future research that similar pathways could be at play in different contexts. The results of this study indicate a strong need for caution regarding land acquisitions due to their adverse impacts on well-being.

Our analysis points to promising areas for future research. The results demonstrate that concurrent drivers of change beyond land acquisitions, such as commercialization of agriculture and accessibility, are key in shaping human well-being. Therefore, future studies should expand the focus from land acquisitions towards place-based research approach that considers multiple, concurrent drivers of change in entire regions. Case study research designs would be highly suitable for this aim, in particular if case studies and national-scale analyses are designed in complementary ways. Furthermore, the repetition of the Quality of Investment Assessment (QI) would allow generating longitudinal data to

ascertain the well-being impacts of land acquisitions over the long term.

Although previous case studies have pointed to the adverse effects of land acquisitions, it remains unclear if the state of knowledge suffers from case selection and publication bias, as individual researchers might be incentivized to focus on critical land acquisition cases. This study is among the first to provide country-scale evidence on the well-being effects of land acquisitions.

We conclude that land acquisitions as a general approach for rural development in Lao PDR are not effective, as most do not contribute to local well-being. Instead, the majority of 176 land acquisitions in our sample generate adverse and trade-offs in outcomes. Based on this, protecting villagers’ land-use rights is imperative. Further, since displacing access to natural resources was a primary cause for reductions in food security, income, and livestock production, communal natural resources must be taken into account. Large-scale land acquisitions should be avoided as their adverse impacts on well-being outweigh the opportunities they present. Employment generated by land acquisitions can become an important cash source, but alone are not sufficient to improve well-being, making it essential to also maintain traditional livelihoods. Further, alternative approaches to agricultural development beyond land acquisitions are needed as focal strategies for sustainable development in rural areas. Strategies building on agroecology and solidarity economy may be a scientifically supported, promising strategy for shaping inclusive development that leaves no one behind in enhancing human well-being and towards achieving sustainable development.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. . Variables included in the analysis

Table A: Variables, measurement, and data source

Variable	Measurement	Explanatory factors							Source
		Characteristics of land acquisitions	Implementation processes	Livelihood option/adaptation	Environmental impacts	Well-being resource	Well-being outcome	Socio-ecological context	
Commodity types	Type of product invested in through the land acquisition	x							LCI – quantitative data
Type of investor	Public, private, state-enterprise, or individual investor	x							Company interviews
Country of origin of the investor	Domestic, economically developed or developing country, or joint-venture between domestic and foreign country	x							LCI – quantitative data
Size of land acquisitions	Number of villages affected by each deal Number of deals affecting each village at the time of assessment	x						x	LCI – quantitative data
Outgrower scheme	Whether a deal established an outgrower scheme in the affected village in addition to the concession scheme, measured as a binary	x							Interview with villager committees and household interviews
Phase of operation	Development or operational	x							LCI – quantitative data
	Age of deals, measured as the difference between the time of assessment conducted and the year that deal started development in the village	x							Interview with villager committees
Degree of consultation	No consultation, consultation with ability to negotiate, and consultation without ability to negotiate		x						Household interviews and interviews with villager committees
Consent	Did not seek consent, consent with FPIC, consent without FPIC, and no consent		x						Household interviews and interviews with villager committees
Environmental impact assessment (EIA)	Initial Environmental Examination (IEE), Environmental Impact Assessment (EIA), and no assessment		x						Company interviews and interviews with the District Office for Natural Resources and Environment (DoNRE)
Environmental monitoring	Monitoring and no monitoring		x						Company interviews and DoNRE interviews
Performance of land acquisitions	Investors' perception on the overall progress of deal development against the overall project schedule, measured as progressing well or not progressing well		x						Company interviews and DoNRE interviews
Land dispossession	The proportion of households per village who experience land dispossession, calculated by dividing the total households who lost land by the total number of households in the village		x						Household interviews and interviews with villager committees
	Average of land dispossessed per household, calculated as total area in hectares divided by the number of households who lost land		x						
Compensation delivery to the affected households	No household with land dispossession, all compensation delivered, partial compensation delivered, no compensation delivered, no compensation promised		x						Household interviews and interviews with villager committees
Ability to access new farmland	Ability of households who experience land dispossession to access new land, measured as access, no access, or no land dispossession			x					Household interviews
Employment	Proportion of working-age village population currently employed by deals			x					Employment data based on household interviews
	Origin of worker measured as from the affected village, neighboring village, other district or provinces, or country of investor			x					Working-age population in the village derived from the 2015 Lao Population and Housing Census (PHC)
	Change of employment opportunities over the last five years measured as increased significantly, increased somewhat, same,			x					

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Variable	Measurement	Explanatory factors							Source
		Characteristics of land acquisitions	Implementation processes	Livelihood option/adaptation	Environmental impacts	Well-being resource	Well-being outcome	Socio-ecological context	
Impacts of agrochemicals	decreased somewhat, or decreased significantly Villagers' perception of impacts of applying fertilizer, pesticides, and herbicides in deal operation measured as positive, negative, negative, no impact or Not applicable/ company does not use agrochemical				x				Household interviews
Change of level and quality water	Villagers' perception of change in quantity and quality of water in the surrounding rivers/streams measured as increased a lot, increased a little, same, decreased a little, or decreased a lot				x				Household interviews
Change in access to farmland	Villagers' perception of change in access to farmland in the affected village since the establishment of land acquisition measured as increased a lot, increased a little, same, decreased a little, or decreased a lot					x			Household interviews
Change in access to NTFPs and animals	Villagers' perception of the availability of NTFPs and wild animals in the affected village since the establishment of land acquisition measured as increased a lot, increased a little, same, decreased a little, or decreased a lot					x			Household interviews
Change in access to timber and firewood	Villagers' perception of the availability of timber and firewood in the affected village since the establishment of land acquisition measured as increased a lot, increased a little, same, decreased a little or decreased a lot					x			Household interviews
Change in access to water for agriculture	Villages' perception of access to water for agriculture in the affected village since the establishment of land acquisition increased a lot, increased a little, same, decreased a little or decreased a lot					x			Household interviews
Road access improvement provided by investors	No improved road access was promised, promised road access was provided, or promised road access was not provided					x			Interview with village committees
New technology or skill transfer by investors	New farming technique, new inputs, or nothing					x			Interview with village committees
Change of overall food security	Villagers' perception of the change in overall food security in the affected village since the establishment of a land acquisition measured as improved significantly, improved a little, same, decreased a little or decreased a lot						x		Household interviews
Change of rice production	Villagers' perception of change in rice production in the affected village since the establishment of a land acquisition measured as increased significantly, increased a little, same, decreased a little or decreased a lot						x		Household interviews
Change of food from nature	Villagers' perception of the availability of food from nature in the affected village since the establishment of a land acquisition measured						x		Household interviews

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Variable	Measurement	Explanatory factors							Source
		Characteristics of land acquisitions	Implementation processes	Livelihood option/adaptation	Environmental impacts	Well-being resource	Well-being outcome	Socio-ecological context	
Change of cash for food	as increased significantly, increased a little, same, decreased a little or decreased a lot Villagers' perception of change in household cash for food since the establishment of a land acquisition measured as increased significantly, increased a little, same, decreased a little or decreased a lot						x		Household interviews
Change of household income	Villagers' perception of change in household income since the establishment of a land acquisition measured as increased significantly, increased a little, same, decreased a little or decreased a lot						x		Household interviews
Change of livestock	Villagers' perception of change in number of large livestock (i.e. buffalo and cattle) in the affected village since the establishment of a land acquisition measured as increased significantly, increased a little, same, decreased a little or decreased a lot						x		Household interviews
Accessibility	Mean travel time from village to nearest provincial capital							x	2015 PHC
Main village economy	Three most important village economic activities in terms of time and labour allocation							x	Interviews with village committees
Land tenure in the affected village	Presence of land title or no presence of land title							x	Interviews with village committees
Land use prior land acquisition	Land use prior to granting to a land acquisition							x	Households interview

## Appendix B. . Overview of sampled land deals and villages

Table B-1: Overview of sampled land deals and villages

	Number of affected villages per deal and number of deals per village			
	Mean	Min	Max	Standard Deviation (SD)
Number of affected villages per deal (N = 294)	3.39	1	68	7.27
Number of deals per village (N = 176)	2.04	1	9	1.68

Table B-2: Number of deals and sampled villages by types of commodities and size

Product	Granted area (ha) (% of total)	Developed area (ha) (% of total)	Number of deals (% of total)	Sampled villages
Rubber	122,332 (50%)	79,069 (47%)	62 (35%)	120
Eucalyptus/acacia	66,316 (27%)	46,711 (28%)	14 (8%)	46
Sugar cane	40,757 (17%)	26,315 (16%)	4 (2%)	26
Large-livestock	8,125 (3%)	6,636 (4%)	35 (20%)	40
Agarwood	2,835 (1%)	803 (<1%)	6 (3%)	7
Cassava	1,077 (<1%)	493 (<1%)	6 (3%)	6
Coffee	852 (<1%)	591 (<1%)	7 (4%)	8
Corn/maize	607 (1%)	345 (<1%)	4 (2%)	3
Banana	588 (<1%)	400 (<1%)	5 (2.8%)	4
Other products	3,141 (1%)	6,214 (4%)	33 (19%)	25
<b>Total</b>	<b>246,631</b>	<b>168,717</b>	<b>176</b>	<b>294</b>

Source: 2017 LCI, table produced by authors.

Table B-3: Number of deals and sampled villages by origin of investor and size

Origin of investors	Granted area (ha) (% of total)	Developed area (ha) (% of total)	Number of deals (% of total)	Number of affected villages
<b>Domestic</b>	<b>31,348 (13%)</b>	<b>11,018 (6%)</b>	<b>86 (49%)</b>	<b>82</b>
<b>Foreign</b>	<b>187,635 (76%)</b>	<b>134,348 (80%)</b>	<b>73 (41%)</b>	<b>188</b>
Economically developed countries	3,037 (2%)	3,284 (2%)	6 (8%)	18
Economically developing countries	184,598 (98%)	131,064 (98%)	67 (92%)	170
<b>Lao-joint venture</b>	<b>27,648 (11%)</b>	<b>23,351 (14%)</b>	<b>17 (10%)</b>	<b>24</b>
Lao-joint venture with economically developed countries	25,359 (92%)	21,742 (93%)	7 (41%)	17
Lao-joint venture with economically developing countries	2,289 (8%)	1,608 (7%)	10 (59%)	7
<b>Total</b>	<b>246,631</b>	<b>168,717</b>	<b>176</b>	<b>294</b>

Source: 2017 LCI, table produced by authors. **Note:** We classified economically “developed” and “developing” countries based on the UN’s categorization (UN, 2019).

**Appendix C. . Detailed archetypal pathways to well-being outcomes of land acquisitions**

Table C-1: Pathways to enhanced and unchanged well-being outcomes.

Explanatory factors	Attributes	Enhanced wellbeing outcomes			Unchanged wellbeing outcomes	
		Pathway 1 (n = 19)	Pathway 2 (n = 18)	Pathway 3 (n = 24)	Pathway 4 (n = 8)	Pathway 5 (n = 7)
Land dispossession and change of well-being resources	% of households who lost land	No land dispossession***	No land dispossession***	1-25%***	No land dispossession***	No land dispossession***
	Access to well-being resource pattern	Same**	Adverse***	Adverse*	Same***	Adverse***
	Ability to access new land			HHs were able to access new land**		
	Delivery of compensation					
Livelihood options/adaptation	% of working age population employed	No employment**	No employment**		No employment**	No employment**
	Origin of workers			Affected village*		
	Change of employment opportunities over the last five years					
Chemical impacts	Fertilizer impact	None***	None**	None**	None***	None**
	Pesticide impact	None***	None**	None***	None***	None**
	Herbicide impact	None***	None***	None*	None**	None**
Water impact	Change of water quantity	Same***	Significant decrease*		Same**	Same**
	Change of water quality	Same***	Same*	Same*	Same**	Same**
Implementation processes	Environmental impact assessment	EIA*				

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Explanatory factors	Attributes	Enhanced wellbeing outcomes			Unchanged wellbeing outcomes		
		Pathway 1 (n = 19)	Pathway 2 (n = 18)	Pathway 3 (n = 24)	Pathway 4 (n = 8)	Pathway 5 (n = 7)	
Characteristics of land acquisitions	Environmental impact monitoring	No monitoring*	Villagers were able to negotiate for deal size, land boundaries, compensation, or benefits**				
	Degree of consultation	Ability to negotiate**					
	Consent	FPIC**	Not FPIC*				
	Phase of operation	Development phase**	Operational phase*	Operational phase*	Operational phase**	Operational phase*	
	Type of investor	Family business**		Private investor*			
	Country of origin of investor	Domestic investor**	Domestic investor*	Domestic investor*	Domestic investor*		
	Product	Livestock**					
	Age of deal operation	0-3 years**	8-11 years*				
	Number of affected villages per deal	1**	1*		1**	1*	
	Accessibility		0.5-1 hour*	>2 hours*			
	Number of deals in the village		1 deal*		1 deal**	1 deal*	
	Socio-ecological context	Type of land document	Land title present**	Land title present*	No land title present*	No land title present**	No land title present*
Main village economy		Lowland farming, cash crop, and livestock*					
Prior land use		Collecting forest products**	Upland rice*, collecting forest products*	Upland rice*, collecting forest products*	Upland rice*	Collecting forest products*	

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Legend		Abbreviations			Consistency	
Explanatory factors	Attributes	Enhanced wellbeing outcomes			Unchanged wellbeing outcomes	
		Pathway 1 (n = 19)	Pathway 2 (n = 18)	Pathway 3 (n = 24)	Pathway 4 (n = 8)	Pathway 5 (n = 7)
	Contrasting factors across pathways in this outcome pattern			HH = Household		*** = 100%
	Contrasting factors with adverse and/or trade-off outcome patterns					** >= 75%
	Low frequency or consistency					* >= 50%

Note: These pathways do not represent the situation of 16 cases because they did not meet the frequency and consistency thresholds.

Table C-2: Pathways to adverse well-being outcomes

Explanatory factors	Attributes	Pathway 6 (n = 25)	Pathway 7 (n = 11)	Pathway 8 (n = 25)	Pathway 9 (n = 13)	Pathway 10 (n = 9)
<b>Land dispossession and change of well-being resources</b>	% of households who lost land	1-25%***	1-25%***	No land dispossession***	26-50%***	> 50%***
	Access to well-being resource pattern	Adverse**	Adverse*	Adverse**	Adverse**	Adverse**
	Ability to access new land	HHs were able to access new land**	HHs were able to access new land**		HHs were able to access new land**	HHs were able to access new land**
	Delivery of compensation					
	% or working age population employed	No employment***	<= 10%***		No employment*	
<b>Livelihood options/adaptation</b>	Origin of workers		Affected village: 11, neighboring villages*	Affected village*	Neighboring villages*	Affected village**, neighboring villages*
	Change of employment opportunities over the last five years					
	Fertilizer impact	None*	None*	None*		Very negative*
<b>Chemical impact</b>	Pesticide impact	None*	None*	None**		None*

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Explanatory factors	Attributes	Pathway 6 (n = 25)	Pathway 7 (n = 11)	Pathway 8 (n = 25)	Pathway 9 (n = 13)	Pathway 10 (n = 9)
Water impact	Herbicide impact			None*		
	Change of water quantity	Significant decrease*	Significant decrease*		Significant decrease**	Significant decrease*
	Change of water quality	Same*	Decrease*	Same*	Decrease*	
Implementation processes	Environmental impact assessment	EIA*			EIA*	
	Environmental impact monitoring	Monitoring*		Monitoring*	Monitoring**	
	Degree of consultation					
	Consent			FPIC*		
Characteristics of land acquisitions	Phase of operation	Operational phase*	Operational phase**	Operational phase*	Operational phase*	Operational phase*
	Type of investor				Private investor*	Public investor*
	Country of origin of investor	Economically developing country*	Economically developing country*		Economically developing country**	Economically developing country**
	Product					Rubber*
	Age of operation					8-11 years**
	Number of affected villages per deal				>10**	>10*
	Accessibility					
	Number of deals per village		2-3 deal*	1 deal*	1 deal*	2-3 deal*
	Type of land document	No land title present*	No land title present*			No land title present**
	Main village economy					
Socio-ecological context	Prior land use	Upland rice*, collecting forest products*, lowland rice*	Collecting forest products*	Upland rice*, collecting forest products*	Upland rice*, collecting forest	Upland rice*, collect forest products**, lowland

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Explanatory factors	Attributes	Pathway 6 (n = 25)	Pathway 7 (n = 11)	Pathway 8 (n = 25)	Pathway 9 (n = 13)	Pathway 10 (n = 9)
					products*, lowland rice*	rice*, garden*
<b>Legend</b>				<b>Abbreviations:</b>		<b>Consistency:</b>
	Contrasting factors across pathways in this outcome pattern			HH = Household		*** = 100%
	Contrasting factors with enhanced, unchanged or trade-off outcome patterns					** >= 75%
	Low frequency or consistency					* >= 50%

Note: These pathways do not represent the situation of nine cases because they did not meet the frequency and consistency thresholds.

Explanatory factors	Attributes	Food security decreased				Food security increased			
		Pathway 11 (n = 18)	Pathway 12 (n = 10)	Pathway 13 (n = 10)	Pathway 14 (n = 8)	Pathway 15 (n = 15)	Pathway 16 (n = 17)	Pathway 17 (n = 13)	Pathway 18 (n = 7)
<b>Land dispossession and change of well-being resources</b>	% of households who lost land	1-25%***	1-25%***	No land dispossession***	No land dispossession***	>25%***	No land dispossession**	1-25%***	>50%***
	Access to well-being resource pattern	Adverse**	Trade-off***	Adverse**	Trade-off***	Adverse**	Adverse**	Adverse**	Trade-off*
	Ability to access new land	HHs were able to access new land***	HHs were able to access new land***			HHs were able to access new land***		HHs were able to access new land***	HHs were able to access new land*
	Delivery of compensation					No compensation*			
<b>Livelihood options/adaptation</b>	% of working age population employed	No employment*	<=10%*		<=10%**				
	Origin of workers	Affected village*	Affected village**, neighboring villages**	Affected village*, neighboring villages*	Affected village**, neighboring villages**	Affected village**, neighboring villages*	Affected village*	Affected village*, neighboring villages*, other provinces/districts*	Affected village*, neighboring villages*

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Explanatory factors	Attributes	Food security decreased				Food security increased			
		Pathway 11 (n = 18)	Pathway 12 (n = 10)	Pathway 13 (n = 10)	Pathway 14 (n = 8)	Pathway 15 (n = 15)	Pathway 16 (n = 17)	Pathway 17 (n = 13)	Pathway 18 (n = 7)
Chemical impact	Change of employment opportunities over the last five years		Decreased significantly*		Decreased significantly**				
	Fertilizer impact	None*	None**	None**	None**	None*	None*	None**	None*
	Pesticide impact	None*	None*	None**	None**	None*	None**	None**	None*
	Herbicide impact	Very negative*	Very negative*	None*	Very negative*		None*	None**	Very negative*
Water impact	Change of water quantity	Significant decrease*	Significant decrease**	Significant decrease*	Significant decrease**	Significant decrease**	Significant decrease*		Decrease a little*
	Change of water quality	Decrease*	Decrease*	Same**	Significant decrease*	Decrease*	Same*	Decrease*	Decrease*
	Environmental impact assessment	EIA*		EIA*				EIA*	
Implementation processes	Environmental impact monitoring	Monitoring*	Monitoring*	Monitoring*	Monitoring*				
	Degree of consultation			Villagers were able to negotiate for deal size, land boundaries, compensation or benefits*					
	Consent		Not FPIC*	FPIC*	FPIC*, not FPIC*			Not FPIC*	Not FPIC*
	Phase of operation	Operational phase*	Operational phase*	Development phase*	Operational phase**	Development phase*	Operational phase*	Operational phase**	Operational phase*
Characteristics of land acquisitions	Type of investor	Private investor*	Private investor*	Private investor*	Private investor**	Private investor*		Private investor**	Public investor*
	Country of origin of investor	Economically developing country**	Economically developing country**	Economically developing country*	Economically developing country**	Economically developing country**			Economically developing country**
	Product	Rubber**			Sugarcane*	Rubber*	Rubber*		Rubber**
	Age of operation		8-11 years**		8-11 years*	8-11 years*			8-11 years*

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Explanatory factors	Attributes	Food security decreased					Food security increased		
		Pathway 11 (n = 18)	Pathway 12 (n = 10)	Pathway 13 (n = 10)	Pathway 14 (n = 8)	Pathway 15 (n = 15)	Pathway 16 (n = 17)	Pathway 17 (n = 13)	Pathway 18 (n = 7)
Socio-ecological context	Number of affected villages per deal		>10*	>10*	>10*	>10*		1*	
	Accessibility		1-2 hours*	3-5 hours*	1-2 hours*	1-2 hours*		0.5-1 hour*	1-2 hours*
	Number of deals in the village	1 deal*	1 deal*	1 deal*, 2-3 deals*	1 deal**	1 deal*	1 deal*		1 deal*
	Type of land document	No land title present**	No land title present**	No land title present**	No land title present**	No land title present*	No land title present*	No land title present*	No land title present**
	Main village economy	Lowland and upland farming and other*	Livestock and other*		Livestock and other**	Lowland, livestock, and cash crop*		Lowland, livestock, and cash crop*	
	Prior land use	Upland rice*, collecting forest products*, lowland rice*	Upland rice*, collecting forest products*, garden*	Upland rice**, collecting forest products**, garden*	Upland rice*, collecting forest products**, garden*	Upland rice*, collecting forest products*, lowland rice*	Upland rice**, collecting forest products**	Upland rice**	Upland rice: 7***, collecting forest products*, cash crop*, lowland rice*
<b>Legend</b>							<b>Abbreviations:</b>		
		Contrasting factors across pathways in this outcome pattern					HH =Household		
		Contrasting factors with adverse, enhanced and/or unchanged outcome patterns					*** = 100%		
		Low frequency or consistency					** >= 75%		
							* >= 50%		

Table C-3: Pathways to a trade-off between food security, income, and livestock  
 Note: These pathways do not represent the situation of 12 cases because they did not meet the frequency and consistency thresholds.

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